

Curing Clouds

Ophthalmology is the branch of medicine that deals with the anatomy, physiology and diseases of the eye. In India, cataracts are the most common cause of preventable blindness, and one company in particular makes the equipment the country's ophthalmologists need and rely on to treat the afflicted.

By Matt Bailey

For the past few decades, the Indian government's National Programme for the Control of Blindness has been working to reach those afflicted with cataracts, all over the country. Mr. R.V Ravichandran is General Manager for Operations at Haas customer, Appasamy Associates Group. "Thanks to the government programme," he tells me, "once someone with cataracts is in the system - even someone in a very remote

location, they may only have to wait a week or two for an operation to restore their sight. In the UK, by comparison, I gather it can take up to several weeks."

Cataracts, he explains, are common in India for many reasons. "Ultraviolet radiation is a principal cause," he says. "People spend a lot of their lives outside in very bright sunshine, so by the time they are elderly, many need surgery." Poor diet is also a cause, affecting all age groups, not just





seniors. Diet for a great number of people in India varies little from the national staples of Roti bread and rice. Seafood is a principal source of Iodine, but in inland areas where fish is scarce, Iodine deficiency is common and as a result, even the very young can develop the milky, opaque clouds that reduce to nothing their view of the world.

Appasamy makes 80% of the interocular lenses used in India to treat patients with cataracts. A replacement, interocular lens is a flexible, plastic insert with positioning and holding struts called haptics. The patient's own lens is removed – usually after it is cryogenically frozen, and the new one is implanted inside the capsular bag of the eye. Often, especially where the patient is elderly, the resulting vision is better than the natural lens before it became diseased. Appasamy produces 300,000 lenses a month, as well as the disposable syringes used to inject them into the eye and an enormous range of other instruments and equipment used in eye clinics and hospitals. The company also has an office and lens manufacturing facility in New York City - Ellis Ophthalmics, near JFK airport, the output from which is almost all imported back into India.

“Indian doctors want US made, imported lenses,” says Mr. Ravichandran, “even though they cost more.”

Other than lenses, almost all of the company's milestone products and innovations over the years have been those that met a local need at a cost far lower than imported equipment. Formed 33-years ago, the company is still chaired by its founder, P. S. N Appasamy. In the 1970s he worked in the USA for a contact lens manufacturer and soon began his own company making a low-cost product to freeze the nucleus of an eye, ready for removal. At that time, a European company made the only similar machine capable of doing the same job. The European machine was too expensive for doctors in India. Mr. Appasamy simplified the design and was able to sell a more suitable product for a far lower price. The new machine became very popular in India and made cataract removal a much more viable procedure, particularly for peripatetic doctors taking their services to patients in rural and remote areas.



Appasamy employs over 2500 people: 1380 at the Puducherry factory, with most of the others based at plants in Calcutta, Chennai and Delhi. The company's current annual sales are more than US\$2 billion, and many of its mainstay products are made on a line of twenty Haas CNC machine tools at its Puducherry factory.

A single Haas Mini-Mill, eleven VF-1 vertical machining centres and eight SL-10 turning centres, make, between them, the parts for 1800 different surgical instruments and pieces of equipment in the Appasamy catalogue; products such as microscopes and slit-lamps used in clinics and operating theatres, and tonometers, for testing the pressure of an eyeball.

"The tonometer is one of our best-selling products and is our own design," says Mr. P. Prakash, Deputy Manager CNC. "All of its 45 different parts are made on the Haas MiniMill. We make 150 finished units a month."

Another successful, home-grown Appasamy product is a YAG laser. After a cataract is removed and replaced with an intraocular lens, it sometimes happens that the capsular bag becomes thicker and 'frosted' behind the lens, causing light to scatter before it reaches the retina. To alleviate the problem, a laser is used to perforate the opaque area of the capsule, allowing light to penetrate more readily. For 20 years, German optical company, Carl Zeiss, made the only YAG laser available in India, until Appasamy designed and built a lower-cost version.





"The YAG laser is another Appasamy success story," says Mr. R.V Ravichandran. "Carl Zeiss only ever sold around 1600 YAG lasers. In the eight years since we launched our product, we have sold 1000 examples."

Appasamy counts more than 10,000 Indian doctors as its customers, all of who are looking for lower-cost and simpler alternatives to imported products, such as ultrasound machines that used to cost \$200-300,000, but that Appasamy now supplies for just \$10,000.

The company's less-invasive system for replacing interocular lenses eliminates the need for surgical stitches, since the hole made to insert the lens is smaller than 5mm. The replacement lens is furled and injected into the eye, where it unfolds, like a ship in a bottle. By eliminating the need for stitches, the procedure is quicker and easier and there's less chance that the eye will deform and lose its shape. As well as making the lenses, Appasamy also makes the single-use syringes, whose moulds are machined on a Haas VF-2 Super Speed.

The Appasamy Slit Lamp alone has 60 components, some turned, some milled, made from aluminium, stainless steel and brass. The company completes 350 assemblies a month, and aims to increase production to 500 a month. The optical assembly for the operating microscope is made on the Haas VF-1s. There are two

models of the finished product: one with continuous magnification, the other with step-magnification, the drum of which is machined in aluminium to 5 microns on the Haas VF-1s. The Appasamy Keratometer, for measuring the curvature of the cornea, used to be made by a Japanese supplier and imported into India, but is now also made by Appasamy. EdgeCAM software.





With so many parts and products, it's not surprising the company spends a great deal of time and effort designing quick-change fixtures and fittings. Batches are often as small as 2-5 components, and some of the machines are set-aside for development work, proving programmes - generated by its EdgeCAM software, and reducing cycle times. On the day of my visit, a long line of new Haas machines, still wrapped after their journey across the North Pacific, were waiting in an unused part of the factory to be unpacked and installed.

"We have sixteen new Haas machines here this week," says Mr. Ravichandran, "ten VF-1s, and six ST-10s. Eighty percent of our employees on the production line are female and they like the Haas machines because they are easy to operate and maintain. The Taiwanese machines we had before were big, complex and intimidating."

Many Appasamy products contain fine, small parts made on the Haas machines. Mr. Ravichandran claims the women machine operators have good manual dexterity, but the main reason why they populate the lines during daylight hours is so they can be at home with their children during the evening, night and early morning.

"The women work the day shifts and the men work the single night shift," he says. "Many of the women join our company directly after school or college and work here for three to four years, until they marry. Some return and continue, many stop work to have children."

With a seemingly inexhaustible demand for clinical equipment and instruments, and with such an enormous, customer base of indigenous ophthalmologists, it's no surprise that Appasamy has enjoyed uninterrupted growth for the past two decades. Business is brisk, in no small part due to the company's relentless development of innovative, lower-cost products. Doctors in India are free to undertake their own private practice, so it is essential that equipment is affordable, which is also why Appasamy runs a scheme to help doctors buy the equipment they need to undertake cataract surgery.

But the company also exports its products, and regularly attends trade shows in the USA and Europe. By doing so, it qualifies for lower taxes on imported machine tools, under a government run incentive.

"Because we export a large part of our production, import duties on the Haas machines are less," says Mr. Ravichandran.



"Our company has also been recognised and awarded for exports, by the Indian government. We received The Engineering Export Promotion Council of India award for the best performance under the category small scale industries."

A lot has been written in recent years about the surge of technology that's swept across India, but authors are usually referring

to the Internet and broadband networks, which have permitted locals to access business opportunities that originate thousands of miles away. Call centres in India have transformed the customer-interface of every cost-cutting insurance company and ticketing agency in the UK and the US. As a result, Indian college leavers can hold a white-collar position with a western company without leaving their native cities.

What's less documented is how engineering companies in India like Appasamy are taking advantage of the best-available manufacturing technology, and in so doing are not only addressing the country's pressing social and health issues – such as helping the blind to see again, but are also quietly establishing innovative Indian products in growing, Western markets. What's good for eye patients in rural India, it seems, is also good for eye patients in the rest of the world.

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